

**TEFR ON AGRO
BASED FOOD
INDUSTRIES**

**IN BASTAR
DISTRICT (MP)**

CFTRI Mysore

C O N T E N T S

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exploitation of our involvement in their work. During the
discussions it emerged that as the first step a detailed
survey of the Bastar district is to be made to identify
potential resources and resources which are underutilised
industries could be recommended for consideration by the
State Government. Accordingly, the Divisional Commissioner
entrusted the assignment to CFTRI in two phases viz.,
carrying out resources survey with a view to establish
potential food industries based on potential resources for
establishment of food industries in the district.

The resources survey study carried out by the CFTRI
clearly reflected that several industries based on
agricultural produce, horticultural products, plantation
crops, animal husbandry, fisheries and forestry could be
established in Bastar District with the available resources and
current expansion plans.

Chapter-I

INTRODUCTION

Optimal utilisation of available resources in any
state through effective application of Science and Technology
is bound to lead to the overall development and prosperity of
that state. Realising this fact the Government of Madhya
Pradesh decided to exploit surplus/underutilised suitable
natural resources in the district of Bastar for promotion of
food and agro-based industries. The Divisional Commissioner
deputed a senior officer from the Department to Central Food
Technological Research Institute (CFTRI), Mysore for

exploration of our involvement in their task. During the discussions it emerged that at the first instance a detailed survey of the Bastar districts in the state to identify potential resources was necessary based on which suitable industries could be recommended for consideration by the State Government. Accordingly, the Divisional Commissioner, entrusted the assignment to CPTRI in two phases viz., carrying out resources survey with a view to establish processed food industries based on potential resources for establishment of food industries in ideal places in Bastar District.

The resource survey study carried out by the CPTRI clearly reflected that several industries based on agricultural produce, horticultural produce, plantation crops, animal husbandry, fisheries and forestry would become possible in Bastar District with the available resources and current expansion programmes for the same. Agro industries play an important role in that they begin the process of industrialisation and serve as catalyst in the transformation of rural economy by virtue of the high linkage effects on the social life of the rural population by improving literacy, health services, transport and communication. The advent of new technological transformation resulted in agriculture and industry coming very close to each other. They are dependent upon each other for their inputs and outputs, and hence, they cannot remain in isolation without the balanced development of each other.

factors, mainly infrastructural facilities, necessary for effective utilization of the resources.

Chapter-II

RESOURCES SURVEY AND PROSPECTS FOR FOOD INDUSTRIES

The Divisional Commissioner, Bastar, entrusted the task of undertaking resources survey for establishing food and agro-based industries in the district to CFTRI, Mysore. A team of scientists from CFTRI Regional Centre undertook the survey work with a broad objective of appraisal of the various currently available as well as potential food and agricultural resources of the district and to assess the prospects of economic and industrial development of Bastar District on the above resources and other complementary

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factors, mainly infrastructural facilities, necessary for effective utilisation of the resources.

Chapter-III

BASTAR - A PROFILE

The District of Bastar is the largest district in Madhya Pradesh and spreads over an area of 39,114 sq.km. The district is situated between latitudes $17^{\circ}46'$ to $20^{\circ}34'$ North and longitudes $80^{\circ}15'$ to 82° East with varying elevations from 152 to 1,200 metres above mean sea level. The district is surrounded by Raipur and Durg districts of Madhya Pradesh, Gadchiroli district of Maharashtra, Karimnagar and Khammam districts of Andhra Pradesh and Koraput district of Orissa. The general configuration of the district is the succession

of undulating ridges with intervening valleys through which flow innumerable streams and rivulets merging themselves in the Indrawati, Sabati and Mahanadi rivers. The great river Indrawati which flows across the centre of the district from East to West with a winding course of above 385 kms, almost bisects the district.

Administration and Population :

The Bastar Division comprises of 11 tahsils and divisional head quarter is at Jagdalpur. The names of Tahsils are as follows.

(1) Jagdalpur; (2) Dantewada; (3) Kondagaon; (4) Kanker; (5) Bijapur; (6) Narayanpur; (7) Konta; (8) Bhanupratappur; (9) Antagarh; (10) Charama and (11) Bhopal-Patnam. The division is further divided into 32 blocks.

The total population of the district as per 1981 census was 18,42,854. Out of the total population about 65.5% are tribals comprising various sub-groups of different communities having both large and small cultural and social variations. According to 1981 census about 14.13% of the population are literate. Main workers in the district constitute about 44% of the total population. Work participation as a proportion of workers in total working population was 60.6% for males and 28.4% for females. A very surprising thing is that in Abhujmad only 3,647 families are residing in the area of 3,880 sq.km.

General Infrastructure :

The main sources of water is from surface flow of major river Indrawati. The river Indrawati flows across the centre of the district from East to West with a winding course of above 385 kms. almost bisect the district. Other source of water is water tank (60%), followed by canal (9.6%), open well (8.9%), tube well (1.4%), and other sources (20.1%).

Power :

The district has a comfortable power position. The total consumption of electricity is 18372.833 MW/hr. The number of villages electrified are 1094. The Madhya Pradesh Electricity Board has 2 divisions and 12 sub-divisions in the district.

Transport and communication :

Railways : The rail communication is limited only to the single broad gauge line of S.E. Railway which links Jagdalpur and Vishakhapatnam.

Road : The district has 7587 KM length of Pucca road. There is one National Highway No.43, which links Raipur and Jagdalpur. All major town/tahsils are connected with black weather road.

Air : The Vayudoot service is available at Jagdalpur which links with important cities of Madhya Pradesh, Raipur, Bhopal, Indore, Jabalpur and Gwalior.

Labour : The labour situation in Bastar is peaceful and conducive to industrial growth. The labour rates are quite low as compared to other parts of the state.

Skilled and semi-skilled person : A number of educational institutes have been started in tribal areas imparting education to the level of undergraduates and polytechnic, besides number of I.T.I.'s offering trade courses. Therefore availability of skilled and semiskilled worker is not a problem.

Brief Information of the District

Area :	Total area	:	39,11,400 Ha.
	Forest area	:	24,52,960 Ha.
	Cropped area	:	8,36,814 Ha.
	Kharif area	:	8,03,342 Ha.
	Rabi area	:	33,472 Ha.
	Fallow	:	6,21,626 Ha.

Population : According to the census (1981)

Total 18,42,854, B.C. 1,10,317, S.T. 12,07,072

Villages : Total 3683, Revenu 3388

Veeram villages 295, Forest villages 160

Electrified villages 1319

Population-wise No. of villages in Bastar District

<u>Population</u> <u>from</u> <u>Upto</u>	<u>No. of villages</u>
01 - 499	2444
500 - 999	634
1000 - 1999	252
2000 - 4999	51
5000 - above	7

<u>Population</u>	<u>Male</u>	<u>Female</u>
Urban	58473	53233
Rural	861848	869300
<u>Literacy %</u> Rural	18.36	5.17
Urban	63.17	42.1

Male female ratio - 9003

Density of population (sq.km.) - 47

Rainfall annual average 94.74 to 127.5 mm

1981-82	1190.7 mm
1982-83	1192.2 mm
1983-84	1145.08 mm
1984-85	1136.9 mm
1985-86	1530.0 mm

Tahsils : 1) Jagdalpur; 2) Dantewada; 3) Kondagaon; 4) Kanker; 5) Bijapur; 6) Narayanpur; 7) Konta; 8) Bhanupratapur; 9) Antagarh; 10) Charama and 11) Bhopalpatnam.

Development blocks : 1) Kanker; 2) Sukma; 3) Sarona (Narharpur); 4) Bhanupratappur; 5) Narayanpur; 6) Koilibeda;

7) Abhujhmad (Orchha); 8) Kondagaon; 9) Reshkal; 10) Pharasgaon; 11) Makdi; 12) Badherajpur; 13) Jagdalpur; 14) Bastar; 15) Durgkondal; 16) Lohandiguda; 17) Tokapal; 18) Darbha; 19) Bastanar; 20) Bakawand; 21) Dantewada; 22) Geedam; 23) Kuskonda; 24) Katekalyan; 25) Bijapur; 26) Bhairamgarh; 27) Konta; 28) Chindgarh; 29) Bhopalpatnam; 30) Osoor; 31) Antagarh and 32) Charama.

Revenue circles : Total 26 Nos., Patwari Circles - 378

Police stations-31 and Police Outposts-32

Educational Institution

1. Colleges	9
2. Higher secondary or high schools	75
3. Middle schools	517
4. Primary schools	3357
5. Model schools	01
6. Tribal hostels	179
7. Tribal ashram	55
8. Schools under 10+2 scheme	53
9. Engineering college	01
10. Polytechnic	Nil
11. Industrial Training Institute	02 (Bastar, Bhansi)
12. B.T.I.	02 (Bastar, Kanker)

Fair Price Shops :

1. Urban : 34
2. Rural : 368

Banks :

Sl.No.	Name of the Bank	No. of branches
1.	Dena Bank	02
2.	Bank of Baroda	03
3.	Bank of India	01
4.	Canara Bank	01
5.	Central Bank of India	02
6.	Punjab National Bank	01
7.	State Bank of India	32
8.	Union Bank of India	01
9.	U.C.O. Bank	02
10.	Bastar Kchetriya Gramin Bank	62
11.	Central Co-operative Bank	27
12.	Land Development Banks	8

Co-operatives : Agriculture - 100
Non-agriculture - 5

Settlement operations :

1. Settlement completed : 1561 villages
2. Work going on : 138 villages
3. Work not started : 1159 villages

Village Panchayats : Total - 962

Veterinary Institution	: 1. Vety. field Asst. Centre
1. Veterinary hospitals	: 35
2. District Headquarter	: 01

Others :

1. O.L. Ds.	: 53
2. Key village centre	: 01
3. Artificial insemination centre	: 04
4. Cattle breeding farm	: Nil
5. Central cattle breeding units	: 37
6. Artificial insemination units	: 36
7. Mobile units	: 01
8. Amulatory clinic	: 07
9. Regional poultry farm	: 02

No. of villages in urban agglomeration : NIL

Fisheries :

No. of fish seed farm - 5

1) Jagdalpur; 2) Kanker; 3) Balenga; 4) Pakhangore and 5) Charama.

Madhya Pradesh Electricity Board

Total No. of villages electrified	: 1094
No. of single point connection guver 1 - general	: 20995
No. of irrigation pumps	: 857 connected
No. of inconnected pumps	: Nil
No. of weekly markets	: 280

<u>Work Department</u>	<u>Circle</u>	<u>Divisions</u>	<u>Sub-Divisions</u>
1. P.W.D.	1	5	17
2. Irrigation	1	6	30
3. P.H.E.D.	1	3	16
4. E & M	-	-	02
5. C & W.D.	-	-	-
6. Rural Engg. Service (RES)	-	-	03
7. Lift irrigation	-	-	-
8. Education	-	1	02
9. Forest	2	16	-
10. M.P.E.B.	-	2	12

Chapter-IV

DISTRICT RESOURCES

Out of the total geographical area (39,11,400 Ha) only 21.4 per cent (873685 Ha) is under cultivation, with 1.6% (13,275 Ha) under irrigation and the double cropped area in the district is about 4% only. It is estimated that out of the 2.13 lakh of total agricultural holding, 41.4% holding are of the size below 2 hectares covering only 8.1% area, while 16.4% of area is under holding of 2-4 hectares occupied by 25.8% of the holder and the rest 75.5% of area having more than 4 hectares holding which comes to 32.8% of the total

holders.

Rice : Rice is the most important foodgrain crop in Bastar and constitute about 65% of the net cropped area. The production of rice during 86-87 was 4127000 M.tonnes. Rice is a staple food of the district. The tribals of Bastar prepare a popular fermented product "Landha" from rice.

Other cereals : Kodokukti is available in abundance. After rice it occupies the 2nd position. Area under cultivation of Kodo is about 1,40,000 Ha and production is about 20,000 MT. It covers 18% of the net cropped area. The cultivation of kodokutki is maximum in Dantewada, Jagdalpur, Konta and Bhanupur tahsils. The area under maize cultivation is 28000 hectare (3.4% of net cropped area) and the production is about 25,000 MT. Maize is consumed in the form of chapaties or used for the preparation of other products. Some fermented and malted products are also prepared from maize. The maize is also popular in tribals.

The other crops are kulthi (4.5%), ragi (1.4%) and jowar (1.2%).

Pulses :

The major edible pulses of Bastar are urid, mung, kulthi, bengalgram and arhar. The area under pulses cultivation is 818389 Ha. and the production is about 8000 MT. The market survey showed a variety of bengalgram which is round in shape and smaller in size. This variety is used for parching. The parched gram has very soft texture and typical

taste. The seed coat can also be removed completely by simple rubbing. It is very suitable for making spiced and sweet snack dishes.

Oilseeds :

Oilseeds have been accorded high priority in agricultural production programme and the main crops are mustard, linseed and sesamum. The area under oilseed cultivation is about 4500 hectares. The other oilseeds prominently niger is also extensively cultivated (20,000 ha). Cultivation of groundnut is in negligible quantity. The production of oilseeds is about 10,000 tonnes (1987-88). The other oil which is popular amongst the tribals is mahua seed oil. The mahua seed oil is extracted (expeller) in large amount.

Horticulture :

The district has a good potential for production of fruits and vegetable. Presently the data on acreage and production is not available with the horticulture departments. On discussion with concerned Government officials, it was gathered that vegetables like tomato, onion, bringal, cucumbar, papaya etc., are grown alongside the river. These are also seen in good quantity in the market. For potato cultivation, Government has given 500 demonstrations. To promote and popularise cultivation of fruits and vegetables, cashew, pineapple and mango, the Horticulture Department had given number of demonstrations to the growers. For mango cultivation, growers were provided

with the grafts of Dasherri, Langra, Chowsa and Baiganpalli varieties. Pineapple and cashew are successful in experimental plantation. One cashew processing unit is proposed to be started at Keralupara. Horticulture Department have also undertaken number of demonstrations in the representative areas of the district to boost production of fruits and vegetables.

<u>Place</u>	<u>No. of demonstrations</u>
Bijapur	650
Dantewada	1640
Sukma	1400

For region for planting of mangoes are Kondagaon and Keralpal, cashew - Kanker and pineapple - Moringa and Keralapal. The district produces wild variety of mangoes. The trees are mostly naturally grown in the forest. Mango has a huge marketable surplus. The mango kernels are procured by the traders and dispatched to Hanuman Vitamins at Khamgaon (Maharashtra) for fat extraction (solvent extraction). The purchase price of mango kernels is Rs.125/- per quintal.

Animal husbandry and Dairy :

The main thrust in the animal husbandry and dairy development sector is on extensions of animal health care facilities and stepping up milk and egg production through genetic improvement of livestock, dairy development and beneficiary oriented programmes.

The population of cattles was around 13 lakhs, buffalo 1.5 lakh, goat 4.16 lakh, sheep 21,000, pig 1.16 lakh, fowl 8.1 lakh and ducks 34,000.

There are 4 milk processing units in the region with the capacity of 2000 litres per day of each unit. Presently there is no surplus milk. The egg production is 338902 (at Poultry Farm, Jagdalpur). There is no cattle/poultry feed processing unit in the district.

Fisheries :

Although the fishing in river has been in vogue since ancient times, the cultivation of fish in pond is of recent origin in the district. The pond area available for fish cultivation is about 3000 hectares and the utilisation is about 8 per cent. The production of fish from pond in the district is about 200 MT. The various developmental schemes, include imparting technical know-how, arranging quality fish seed, incentives in the form of loan and subsidies for purchasing fish seed, repairs to pond. There is no regulated fish market in the district. Whatever the quantity of fish produced in the region is brought to the village market and sold. The production of fishes in Dudhawa pond, which is biggest in the district is 120 MT. The small fishes are sold in village markets whereas fishes large in size are sent to Howrah. In village market dried and salted fishes are sold. The selling price is Rs.25-35/- per kg. There is no fish processing or chilling plant or fish feed plant in the

district. There are five fish seed farms at 1) Jagdalpur; 2) Kanker; 3) Balanga; 4) Pathangore and 5) Charana.

Forestry :

Bastar has a vast forest resources and provide adequate opportunities for industry. Sixty three per cent area of Bastar is under forest. It is one of those unique areas in the country where Sal and teak are found together. In addition to this rosewood, bija, tendu, sarji, harra, dhawada, mahua, tamarind, chirongi, bal, amla, mahul etc., are also available. The forest of this district represent 3% of our country's and 13 per cent of State's forest area. The total annual value of forest product was about Rs.437 million (82-83). It is estimated that with the provision of proper transport linkage alone the income from forest produce would increase to bout 100 crores per year.

Bastar forest is divided into two circles 1) Kanker circle covers the north and 2) Jagdalpur circle covers the south. The economy of the tribal of Bastar is based on major forest produce like mahua and tamarind. The production of mahua flowers is about 86000 quintal (1986). Mahua has a prominent place in their food. They prepare laddoos of mahua. They also prepare mahua liquor out of mahua flowers. Tribals collect the mahua flowers, dry them and store or sell in the village market. The selling price ranges from Rs.150 to 400/- per quintal depending on the season. The season for mahua flowers is March-April. Mahua seed is also available

in plenty. Tribals extract the oil from seeds and use it either for edible purposes or for massage of skin. In village markets dried mahua seed are sold to the traders. The selling price ranges from Rs.4 to Rs.5 per kg. The season for the mahua seed is April-June. Doiled cake of mahua seeds has a good market. Traders purchase from the market and sell it as animal feed.

✓ Tamarind is an important forest produce of Bastar forest. Tamarind from Bastar is famous for its quality. Though it is not consumed in the region, it is collected and sold to traders. According to information given by Conservator of Forest, Jagdalpur, about 11.5 lakh quintal of tamarind is produced in the Bastar. At Jagdalpur market alone about 5000 bags (50 kgs. each) of tamarind is sold per day during the season. The traders after purchasing tamarind in the village mandies, despatch it to southern and northern parts of India. It is also exported to middle east countries. To prevent the deterioration of colour, they store the tamarind in cold storages. There are 5 cold storages in Jagdalpur. The purchasing rate by trader are Rs.2.00 to Rs.2.50 for tamarind with seeds and Rs.5 to Rs.6 for tamarind without seed.

In Jagdalpur, one unit for tamarind seed starch production has recently gone into production. The local purchase price of tamarind seed is Rs.100/- per quintal. The turnover of the unit is 600 MT/annum. Mostly the starch produced is sold to textile units and Koonkum/Sindhur

manufacturing units. The selling price of starch is Rs.335/- quintal.

Tribals also prepare tamarind seed powder after roasting. The powder is use in preparation of food product like "Paj" (liquid fermented food) etc.

Chironji (Char) : Char is an important produce of th forest. The prouction of chironji seeds is about 1700 quintals per annum. The selling rate of dehulled seeds is Rs.28/- per kg.

Amla : Amla is also available in large quantity. Tribals do not consume amla. The production of amla is about 20,000 quintal per annum. The purchasing rate of aml from tribals is 50 paise/kg. However it is sold at the rate of Rs.5/- per kgin Delhi and other important markets. From Bhairamgarh market alone 2-3 truck loads of amla is despatched to Raipur everyday and from Raipur it is sent to Delhi market. There is no amla processing unit in the region.

Tubers (Kanda) : These are naturally available in the forest and are the important food item of the tribals. They are starchy in nature. There are about 13 varieties. The important varieties are (1) Tikhur Kanda - it is available in Bhairamgarh, Bijapur and Gangalur region. This is a root tuber. This is known for its medicinal properties, ayurvedic tonic. Tikhur powder is sold at Rs.40/- per kg. There are other tuber varieties and are locally known as Kulia Konda, Chungri Konda, Barha Konda, Kumda Konda, Keshrue Konda, Semar Konda, Uski Koda, Dang Konda, Shanker Konda etc. They are

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available in fruit form or root tuber form. They are consumed by the tribal either in cooked form or raw.

Apart from these they also consume leafy vegetable which are available in plenty in forest. They are Chiur Bhaji, Koliari Bhaji, Toreta Bhaji, Patar Bhaji, Chunchunia Bhaji etc.

Mango : Wild variety of mangoes are also available in plenty. It is consumed by the tribals and surplus is sold in the market. The mango kernels powder are also used for the preparation of chapata. The flour is also used for the preparation of fermented drink known as "Pej". Mango kernels which contains good amount of fat are collected by tribals and sold to traders who purchase and sent to fat extraction unit at Khargaon. The purchase price of dried kernel is Rs.1.25 per kg.

Honey : Honey is collected by tribals from forest and sold in the market. The approximate quantity sold in the market is about 900 quintal in a year.

The other important forest produce in the region are Banane (wild variety naturally grown in the forest), Kusum, Karanji, Cashew, Hawding, Behada, Sikakai, Butea leaves, Mahul leaves etc.

The other popular food crop which is naturally available is mushroom. There are about 3 edible variety. They use mushroom for the preparation of curry. The local

names by which they are popular are 1) Jam chat; 2) Dengur chat and 3) Nanai chat.

Cosa silk pupae : The cocoons are collected from the forest and are sold in village markets or at the cosa silk factory at Jagdalpur under Tribal Welfare Society. The purchase price is 50 paise per cocoon. After silk yarn manufacture from cocoon, the waste (cocoons) after drying is either sold as poultry feeds at the rate of Rs.125/quintal or discarded/dumped as it emits foul putrified smell. The annual waste production is about 1 tonne per annum.

Taluk-wise Area and Population & Density of Population
In Bastar District

Tahsil	Area (sq.km.)	Population	Density
1. Bhanupratappur	1371.7	93707	68
2. Kanker	1750.6	219356	125
3. Narayanpur	3140.0	197074	63
4. Kondagaon	3682.3	313385	85
5. Bijapur	4508.4	153698	34
6. Dantewada	2211.0	194895	88
7. Jagdalpur	4091.4	509010	124
8. Konta	2390.2	101789	68

Source : Census, 1981.

Taluk-wise Area Under Cultivation (Agric. Crop)
In Bastar Division

Taluka	Kharif	Rabi	Total area in Hectare
Bhanupratappur	56537	913	57452
Kanker	57660	5327	62987
Narayanpur	53644	303	53947
Kondagaon	121854	1739	123593
Bijapur	50301	1597	51898
Dantewada	106201	640	11260
Jagdalpur	173148	2230	175378
Konta	11275	3092	115843
Antaragh	25986	145	26131
Charama	27160	1890	29050
Bhopal Patnam	21637	2563	24200
Total	806879	20519	827458

Source : District Statistical Hand Book, Bastar, 1987.

Irrigated Area Under Cultivation Of Agric. Crop
In Bastar - Taluk-wise

Taluka	Canals	Water tank/ reservoir	Well	Total area in hectare
Bhanupur	-	464	76	540
Kanker	3107	783	561	1344
Narayanpur	28	1283	5	1288
Bijapur	-	36	16	52
Dantewada	-	16	2	18
Jagdalpur	-	820	272	1092
Konta	158	224	14	238
Kondagaon	-	929	107	1036
Anlagarh	-	-	33	33
Charama	1456	1182	197	1379
Bhopal Patnam	-	2470	40	2510
Total	4749	8207	1323	9530

Source : District Statistical Hand Book - Bastar, 1987.

Area Under Different Food Crops In Bastar District

Crop	Year				
	82-83	83-84	84-85	85-86	87-88
	(in Hactare)				
<u>CEREAL</u>					
Rice	531588	545175	552097	557290	555400
Wheat	2885	2715	2576	2853	2600
Jowar	9925	9636	9037	7864	
Maize	20483	28506	28243	28039	28000
Kodokutki	142873	-	138743	140009	162460
Other cereals	26603	71722	22647	22513	-
Total cereals	742390	757755	754343	75589	-
<u>PULSES</u>					
Gram	2376	2402	2206	2515	
Arhar	2106	2012	2165	2344	
Mung	2950	N.A.	2617	2985	
Urid	9370	N.A.	11272	11703	
Other pulses	41555	55108	39046	39948	
Total pulse	58357	59522	57306	59495	
Total foodgrain	800747	817277	811649	818084	
Sugarcane	749	681	793	579	
Total fruit crop	2055	2092	2231	2307	
<u>VEGETABLES</u>					
Potato	84	56	56	77	
Other vegetables	4805	4861	4793	4981	
Total	4889	4917	4849	5050	
<u>SPICES</u>					
	1042	797	839	905	
<u>OILSEEDS</u>					
Sesamum	2502	2493	1968	23950	2320
Linseed	4019	4692	4195	4545	3945
Groundnut	1	16	21	69	
Rapeseed & mustard	16080	16510	16363	16515	16210
Other oilseeds	19066	19815	21208	26400	20030
Total oilseed	41668	42526	43755	45345	

Source : District Statistical Hand Book, Bastar, 1987.

Production Of Different Food Crops In Bastar

(in '000 M.T.)

Crop	Year				
	82-83	83-84	84-85	85-86	87-88
<u>CEREALS</u>					
Rice	562.3	553.9	526.8	507.6	112.4
Wheat	2.4	1.6	1.88	1.9	1.6
Jowar	4.4	5.9	6.44	1.7	4.7
Maize	32.5	26.7	30.52	26.7	22.0
Kodo-Kutki	26.0	23.8	23.16	20.9	19.2
<u>PULSES</u>					
Gram	0.6	0.6	0.68	0.6	0.67
Tur	2.1	2.07	2.45	2.4	2.1
Mung Moth	0.5	1.1	0.9	1.0	1.0
Urid	3.3	4.08	4.48	4.4	4.3
Sugarcane	5.7	2.1	2.69	1.6	0.61
<u>OILSEEDS</u>					
Linseed	0.7	0.7	0.69	0.9	0.32
Groundnut	-	0.8	0.02	0.04	0.02
Sesamum	0.3	0.3	0.26	0.2	0.20
Mustard	5.3	5.1	5.8	4.9	4.42

Fruits & Vegetable : No data available although these are produced in the region like Kodagaon, Kanker, Jagdalpur and area around Tahsil H.Q.

Source : District Statistical Hand Book, Bastar, 1987.

Production Of Forest Produce Of Bastar - 1987

Forest Produce	Prod. in quintal
Amla	20,000
Tamarind	11,50,000
Chironji	1,720
Honey	910
Chawta seed	15,000
Tikhur (Tuber crop)	1,200
Kusum seed	2,500
Salseed	11,500
Mahua flower	13,830
Mahul leaves	8,000
Karanja	600

Source : Conservator of Forests, Jagalpur Circle

Forest Division

North	-	Kanker Circle	-	Tah. Narayanpur Kondagaon Kanker
South	-	Jagdalpur Circle	-	Jagdalpur Bijapur Sukma Dantewada

Animal Products - Bastar District

1. No. of animals slaughtered - 7848 (Goats)
2. No. of slaughter houses - Jagdalpur, Kondagaon, Kanker
3. Total meat production - 68,259.7 Kgs.
4. No. of milk processing units - Jagdalpur, Kondagaon, Kanker, Bhanupratappur
5. Capacity of unit - Jagdalpur - 2000 litres
Kanker - 2000 litres
Kondagaon - 1000 litres
Bhanupratappur- 1000 ltrs.
6. Surplus milk - Nil
7. No. of meat processing units - Nil
8. Meat produced is consumed within the district
9. No. of animal feed manufacturing plant - Nil

Egg production - 3,38,902

Taluk-wise Distribution Of Area Under Cereals (1987)

Area in hectares							
Taluka	Rice	Wheat	Jowar	Maize	Kodo- kutki	Other cereals	Total cereal
Bhanupur	32811	151	115	1138	16558	666	51439
Kanker	43380	1157	442	659	8152	1172	55003
Narayanpur	36664	50	49	2749	7220	894	47626
Kondagaon	90377	432	371	7232	6021	3830	108263
Bijapur	44244	2	119	884	2525	964	48738
Dantewada	51317	26	341	3581	41425	5275	101965
Jagdalpur	128149	361	866	6487	23311	5046	164220
Konta	74227	6	4543	3231	24450	3071	109528
Antagarh	14586	3	27	1106	6099	470	22292
Charama	22034	435	124	170	3063	244	26070
Bhopal- patnam	20095	1	1757	738	179	93	22863
Total	557884	2624	8754	27975	139003	21725	75863

Source : District Statistical Hand Book, Bastar, 1987.

Taluk-wise Distribution Of Area Under Pulses (1987)

Taluka	Gram	Arhar	Mung	Urid	Other pulses	Total pulses
Bhanupur	294	178	124	1125	3962	57122
Kanker	954	41	138	863	5050	62049
Narayanapur	102	183	99	1170	4487	53667
Kondagaon	610	176	89	5541	7534	12213
Bi jagpur	4	24	488	184	2015	51453
Dantewada	9	564	246	554	2982	106320
Jagdalspur	472	665	73	1227	5260	171918
Konta	49	513	1557	293	3071	115011
Antagarh	23	97	68	695	2810	25985
Charama	187	34	86	389	1856	28622
Bhopalpatnam	9	16	246	116	779	24029
Total	2714	2491	3214	12157	39806	818389

Source : District Statistical Hand Book, Bastar, 1987.

Taluk-wise Distribution of Area Under Oilseeds
In Bastar District

Area in hectare						
Taluka	Sesamum	Lin- seed	Ground nut	Mustard	Others	Total
Bhanupur	58	442	2	697	83	1282
Kanker	394	1879	1	202	99	2575
Narayanpur	2242	44	1	2543	1126	3956
Kondagaon	432	333	7	5207	4545	10624
Bijapur	73	-	2	454	157	686
Dantewada	62	-	3	2229	890	3184
Jagdalpur	253	85	11	2740	14445	17534
Konta	79	-	3	946	79	1107
Antagarh	87	15	-	986	680	1768
Charama	116	1144	24	6	9	1299
Bhopalpatnam	39	-	-	2	3	44
Total	1835	3942	54	16112	22116	44059

Source : District Statistical Hand Book, Bastar, 1987.

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Taluk-wise Distribution Of Area Under Sugarcane, Fruits,
Vegetables And Spices In Bastar (1987)

Area in hectare						
Taluks	Sugar-cane	Total fruit crop	Potato	Other vegetable	Total	Total spices
Bhanupur	-	66	-	200	200	62
Kanker	2	206	1	548	549	278
Narayanpur	11	94	-	210	210	45
Kondagaon	75	329	30	599	629	103
Bijapur	-	166	1	331	332	33
Dantewada	-	231	-	274	274	53
Jagdalpur	505	819	39	1802	1841	256
Konta	-	170	-	609	609	63
Antagarh	-	24	-	106	106	16
Charama	-	131	2	225	227	76
Bhopalpatnam	-	25	-	127	127	64
Total	593	2264	73	5031	5104	1048

Source : District Statistical Hand Book, Bastar, 1987.

Project-wise Weekly Market Centres - Bastar

<u>Name of the Project</u>	<u>No. of Blocks</u>	<u>No. of markets</u>
1. Jagdalpur	7	56
2. Kondagaon	5	46
3. Kanker	5	49
4. Narayanpur	4	18
5. Dantewada	4	13
6. Konta (H.Q. Sukma)	3	19
7. Bijapur	4	18
Total	32	219

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Animal Husbandry In Bastar - Taluk-wise

(Livestock - number)
1985-86

Taluka	Cattle	Buffa- lo	Sheep	Goat	Pig	Fowls	Ducks	Total poultry
Bhanupur	70956	13047	1635	33627	10275	57497	148	57645
Kanker	83395	10539	2620	25972	10044	53217	1499	54716
Narayanpur	80595	12943	55	19973	2556	36712	241	36958
Kondagaon	230312	31325	3330	79307	19144	198467	4662	203129
Bijapur	86415	1975	15	30055	4357	37815	502	38317
Dantewada	149702	6166	522	50991	21340	68247	2329	70576
Jagdalpur	243121	51911	9658	78439	22562	221726	21769	243495
Konta	175996	8646	2035	53270	15741	67257	4507	71764
Antagarh	37412	5242	226	17349	974	24737	166	24903
Charama	41467	5447	494	9438	3704	22883	83	22946
Bhopalpatnam	84056	6240	665	18126	5212	27535	64	27599
Total	1283427	153501	21255	416547	115909	818098	35950	852048

Small Scale Industries And Their Installed Capacity (1988)

1. Soft drink	1	12000 bottles	-	-
2. Biscuit/bread	9	46 MT	19	792.2 MT
3. Flour mill	No roller flour mill in the region			
4. Dal mill	-	-	-	-
5. Oil mill	-	-	8	2290.8 MT
6. Paste good	-	-	-	-
7. Other cereals (Poha & Murmura)	-	-	2	160.4 MT
8. Confectionery	1	-	1	45.0 MT
9. Dairy	-	-	-	-
10. Processed food	-	-	-	-
11. Processed meat & poultry	-	-	-	-
12. Tamarind starch unit	-	-	1	600.0 MT
13. Fruit and vegetable	-	-	-	-
14. Spices	-	-	1	36.44 MT
15. Rice milling				
Sheller type	-	10		
Sheller cum huller	-	1		
Mini Sheller	-	1		
Huller No.2	-	28		
Huller No.8	-	303		
Huller No.5	-	5		

Source : District Industries Centre, Jagdalpur.

Chapter-V

IDENTIFICATION OF INDUSTRIES FOR ESTABLISHMENT OF FOOD INDUSTRIES

There is increasing recognition that processed food industries along with agriculture hold a key position in the economy of the state. Integrated agriculture and industry is a pre-requisite for the prosperity and economy of the Madhya Pradesh State as the region is predominantly agrarian. Agro-industries mark the beginning of industrialisation and also play an important role in agricultural development itself. This will ensure a balanced integrated economy by raising the

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income and standard of living of a large section of rural population and especially significant in the context of Madhya Pradesh as the State has a rural bias and provide answer to unemployment problem.

Agro-industries are labour intensive, requires relatively low capital investment and provide higher employment potential per unit investment, especially areas not suitable for other industries. A region producing only agricultural raw materials have limitations in achieving a high per capita income since labour productivity in agriculture is less than in industry. It is a fact that per capita income of Madhya Pradesh has always been much lower than per capita national income and the Bastar District is industrially backward in Madhya Pradesh. The momentum of industrialisation created during 1980-85 will no doubt contribute to a great extent in increasing the income of the State. The process of industrialisation of the Bastar District was slow in the past. Though the District is endowed with abundant natural resources for setting up of food processing industries the growth of the same is negligible. Only through specialised handling and processing can an agricultural area increase its productivity, by value addition to the gross national product. Also the processing units promote indigenous entrepreneurship, infrastructural facilities and help distribution of wealth.

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Apart from the compelling economic needs, agro-industries play an important role in that they begin the process of industrialisation and serve as catalyst in the transformation of rural economy by virtue of the high linkage effects on the social life of the rural population by improving literacy, health services, transport and communication. The current technological transformation has resulted not only in agriculture and industry coming very close to each other,,but are also dependent upon one another for their inputs and outputs. Thus agriculture and industry cannot remain in isolation without the balanced development of each other.

Based on the above broad objectives, an attempt was made through a survey by CFTRI to assess and evaluate the natural food resources and identify their potential to sustain economically viable food and allied industries in Bastar District. The survey brought out that several industries based on agricultural, horticultural, plantation crop and forestry resources have good potential.

Suggested Food & Allied Industries In Bastar District :

1. Jagdalpur

Resources	Products
a) Cereals, pulses and oil-seeds (rice, wheat, jowar, maize, ragi, urad, tur, kodokutki)	Energy food, ragi malt, weaning food, bread and biscuits, instant mixes (idli, vada, dosa)
b) Fruits (mango, banana, papaya)	Fruit bar, fruit pulp, fruit toffee, squash, pickles and chutney

c) Tomato	Tomato ketchup, tomato sauce
d) Tamarind	Tamarind powder, tamarind juice concentrate
e) Spices	Spice powder, masala/curry powder
f) Amla	Amla pickle, preserve
g) Potato	Potato chips/wafers

2. Kankor

Tamarind powder, bread and biscuit, spice powder, leaf cup/plat machine, hand operated pulse dehusker, pickle/chutney, tomato ketchup, fruit bar, weaning food, modern rice mill, poha mill, papad, amla processing.

3. Kondagaon

Fruit bar/toffee, papain, tamarind powder, pickle/chutney, spice powder, papad, pulse dehusker, modern rice mill, leaf cup/plate machine, cashew processing, amla processing, potato chips/wafers

4. Gidam

Biscuit/bakery, pickle/chutney, papad, modern dal mill and pulse dehusker, tamarind powder, mini grain mill.

5. Dentewada

Tamarind powder/tamarind seed powder (starch), leaf cup/plate, pulse dehusker, amla processing - pickle, preserve, papain, mango bar, instant mixes, sugarcane juice processing.

6. Bijapur

Modern rice mill, poha mill, tamarind powder, leaf cup/plate machine, pulse dehusker, spice powder/masala powder, mini grain mill, pickle and chutney, bread and biscuit.

7. Bhopalpatnam

Mini grain mill, leaf cup/plate machine, ragi malt, pickle and chutney.

8. Konta

Poha mill, mini grain mill, tamarind powder, leaf cup/plate, biscuit and bread, mini rice mill, parboiling unit, pulse dehusker.

9. Narayanpur

Tamarind powder, bread and biscuit, pickle, fruit bar, leaf cup/plate, pulse dehusker, amla processing-preserve, dehydrated amla.

10. Bhanupratappur

Tamarind powder, leaf cup/plate, pickle/chutney, spice powder, mini grain mill, mini rice mill.

Recommendations

Bastar is a district rich in forest resources. The production of agricultural and horticultural crops is limited and not sufficient to meet the local needs. Primary

processing industries, mostly rice milling and oil milling are also traditional and based on age-old technologies. There is no organised effort made to collect the valuable forest resources and so the economy is in the hands of few private agents, who procure the valuable forest produce like tamarind, mahua, chironji etc., and other oilseeds from various weekly markets at a price dictated by them. These agents/traders do not make any effort to further clean or grade the produce but despatch it directly to the destinations in north and south. It is therefore very essential that an organised effort either through market committees or other agencies be made to collect the valuable raw materials at a centralized place, cleaning, sorting, grading and packing them into convenient packs, can itself provide new avenues for employment. The collected material then can be used as raw material for various food and forest based industries. There exists great potential for the following industries in Bastar.

Food processing is at a primitive level in Bastar, since about 70% of the population is adivasi or tribal. A demonstration-cum-training unit to educate the people is a prime necessity. Such centre should be located at Jagdalpur and have model units on rural technologies developed by CFTRI. The following units/activities are proposed.

1. Leaf cups and plates
2. Papad Press
3. Spice/Masala powder

4. Manufacture of malted weaning food
5. Instant mixes
6. Energy food
7. Processing of fruit beverage, ketchup and squash
8. Pickle
9. Potato flour/chips
10. Tamarind powder
11. Manufacture of bread
12. Cashew processing
13. Manufacture of biscuit
14. Mini wheat mill
15. Manufacture of jam/jelly/marmalades

CHAPTER VI

PROJECT PROFILE ON IDENTIFIED PRODUCTS

To begin with, 15 units of small scale and cottage scale level has been identified and a profile on each has been highlighted.

An investment and profitability of individual unit has been calculated and shown in the following page.

Investment & Profitability Of The Individual Unit

(Rs. '000)

Particulars	Total invest- ment	Total cost of prodn.	Total sales	Net profit
1. Energy food	4,406	5,517	6,300	524
2. Weaning food	1,607	2,544	2,854	207
3. Instant mixes	1,379	3,644	3,900	171
4. Beverages	1,483	6,538	6,825	192
5. Pickle	893	2,755	2,910	104
6. Jam & jellies	1,091	1,668	1,860	129
7. Potato products	1,098	1,324	1,515	128
8. Tamarind powder	987	2,510	2,700	127
9. Spice/masala powder	1,334	4,965	5,235	181
10. Cashew processing	3,552	19,270	19,800	355
11. Manufacture of bread	1,633	2,264	2,592	220
12. Manufacture of biscuit	2,768	8,006	8,550	365
13. Mini wheat mill	548	755	848	62
14. Papad Press	1,168	2,001	2,250	167
15. Leaf cup & plate	396	429	526	65
TOTAL	23,983	64,190	68,664	2,997

MINI WHEAT MILL
(800 kg/day)

1. Introduction

Presently about 80% of the total annual production of wheat is ground in about 3 lakh units of disc mills (chakkis) operating in cities, towns and electrified villages. Atta, the whole wheat flour, the only milled product from chakkis is mainly used for preparation of chapati or roti.

For several decades, maida (the resultant atta - refined wheat flour) the raw material for bakery industry is processed only in highly capital intensive and sophisticated roller flour mills. All commercial units making bakery products in urban and rural areas have to depend entirely on roller flour mills.

The small scale sector of the baking industry is often confronted with problem of availability of desired quality maida and the required quantity.

A simple wheat milling process to obtain simultaneously bakery flour and chapati/roti atta, is a great relevance to rural regions.

2. Process in brief :

The process consists of the following steps :

- Cleaning of wheat
- Tempering/conditioning of wheat
- Bran removal
- Grinding
- Sieving

3. Finanial Estimates and Economic Feasibility

Capacity - 800 kg/day/shift

Working - 300 days (at 80% capacity)

I. Total Project Cost Rs.'000

1. Land and building	177.00
2. Plant and equipment	204.00
3. Contingencies, 15%	57.00
4. Technical knowhow fee	10.00
5. Preparation of DPR	20.00
6. Furniture & Fixtures	20.00
7. Preliminary & Pre-operative expenses	30.00
8. Working capital (Margin)	30.00

	548.00

II. Means of Finance (Technical)

Term loan	-	332.00
Subsidy	-	100.00
Equity (17.5% of P.C.)	-	125.00

		557.00

Debt : Equity ratio = 1.47 : 1

III. Annual Cost of Production

1. Raw material	480.00
2. Packaging material	24.00
3. Utilities and Overheads	91.00
4. Salary and wages	69.00
5. Depreciation (Bldg.5% + P&E 15%)	29.00
6. Interest on term loan (13.5%)	45.00
7. Interest on soft loan (18%)	17.00

	755.00

IV. Annual sales

1. Bakery flour - 81,600 kg @ Rs.4	326.40
2. Atta - 1,31,400 kg @ Rs.3.80	499.30
3. Bran - 17,400 kg @ Rs.1.30	22.60

	848.30

V. Profitability Rs.'000

1. Annual sales	848.00
2. Less cost of production	755.00
3. Gross profit	93.00
4. Less tax deduction	31.00
5. Net profit	62.00

MANUFACTURE OF BISCUITS (2 Tons per day)

1. Introduction

Biscuits have more food value with substantial energy, protein, carbohydrates and minerals apart from the good taste. Further, vitamins can be incorporated in the biscuit recipe that are essential for balanced diet at a reasonably low cost. Consumption of biscuits is gaining more and more popularity.

2. Process in brief

The process mainly consists of mixing the essential ingredients, viz., maida, sugar/salt and vanaspati, and making a dough. Other optioned ingredients like liquid glucose, chemicals, essences, milk powder, glycerine monostearate (GMS), etc., may also be added in requisite quantities during the mixing stage. The dough is broken into fixed sizes suitable for feeding to the biscuit moulding cutting machine. The dough is moulded into required shapes and sizes of biscuits and the moulded biscuits are transferred onto the mesh-belt-conveyor of the biscuit baking oven. The biscuits get baked at a temperature of about 300°C for about 5 min, as they traverse through the oven. At the end of baking, there is an oil spray unit which sprays refined oil/vanaspati on the hot biscuits. Then the biscuits travel on the natural cooling conveyor at the end of which there is an arrangement to stock the biscuits ready for packaging.

3. Financial Estimates and Economic Feasibility

I. Total Project Cost Rs.'000

1. Land and building	668.00
2. Plant and equipment	1154.00
3. Contingencies, 15%	273.00
4. Technical knowhow fee	20.00
5. Preparation of DPR	50.00
6. Furniture and fixtures	30.00
7. Preliminary and pre-operative expenses	207.00
8. Working capital (margin)	366.00

	2768.00

II. Means of Finance (Technical)

Term loan	1765.00
Subsidy	380.00
Equity	623.00

	2768.00

DER = 1.76:1

III. Annual Cost of Production

1. Raw material	5101.00
2. Packaging material	1008.00
3. Utilities and overheads	484.00
4. Salary and wages	393.00
5. Depreciation (Bldg. 5%, P&E 15%) (3rd year of operation)	154.00
6. Interest on term loan (13.5%)	238.00
7. Interest on soft loan (18%)	247.00
8. Merchandising expenses	381.00

	8006.00

IV. Annual Sales

Sales return at average, selling price (exclusive of tax) @ Rs.14,250/- per ton for 600 tonnes	8006.00
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V. Profitability

1. Annual sales	8550.00
2. Less cost of production	8006.00
3. Gross profit	544.00
4. Less tax deduction	179.00
5. Net profit	365.00

CASHEWNUT PROCESSING (5 T raw material/day)

1. Introduction

Cashew tree, is an erect spreading evergreen tree growing to a height of about 14 meter with a spurious fruit botanically. The fruit portion is known as cashew apple and has a kidney shaped nut attached to it. The nut will be greenish grey in colour. The nut is thick and cellular and contains an acrid oily juice which is powerfully corrosive. It encloses the endosperm, white kernel (about 30% of the nut) covered by a thin reddish brown skin or testa.

2. Process in brief :

The harvested nuts are dried in the sun and stored. The dried nuts are cleaned to remove stones, twigs, etc., in a rotary sieve separator. The cleaned nuts are water conditioned in cement tanks. The conditioned nuts are subject to roasting in an oil bath roaster and finally centrifuged to get roasted nuts and oil (by-product) separately. The roasted nuts are shelled manually. The shelled kernels are dried in a drier at 70°C for about 4-5 hr. The dried products thus obtained is hand peeled and graded. The finished product is packed in 4 gallon (18 lt) tins in carbon dioxide atmosphere.

3. Finanial Estimates and Economic Feasibility Capacity - 5 T raw material processing/day

I. Total Project Cost	<u>Rs. '000</u>
1. Land and building	909.00
2. Plant and equipment	1113.00
3. Contingencies, 15%	303.00

4. Technical knowhow fee	10.00
5. Preparation of DPR	60.00
6. Furniture & Fixtures	40.00
7. Preliminary & Pre-operative expenses	200.00
8. Working capital (Margin)	917.00

	3552.00

II. Means of Finance (Technical)

Term loan	-	2114.00
Soft loan	-	400.00
Subsidy	-	416.00
Equity	-	622.00

		3552.00

III. Annual Cost of Production

1. Raw material	15000.00
2. Packaging material	672.00
3. Utilities and Overheads	360.00
4. Salary and wages	281.00
5. Depreciation (Bldg.5% + P&E 15%) (2 shifts)	190.00
6. Interest on term loan (13.5%)	285.00
7. Interest on soft loan (18%)	730.00

	17518.00
Merchandising expenses	1752.00

	19270.00

IV. Annual sales

Cashew kernels 1.5 T x 30 days x Rs.44,000	19800.00
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V. Profitability

1. Annual sales	19800.00
2. Less cost of production	19270.00
3. Gross profit	530.00
4. Less tax deduction	175.00
5. Net profit	355.00

MANUFACTURE OF BREAD (3600 Standard loaves/day)

1. Introduction

Wheat production has doubled from 14 million tonnes to 28 million tonnes in the last 8 years. At present, India is self-sufficient in wheat and in the years to come it may have surplus wheat. Mostly wheat is consumed in North India in the form of chapati, roti, while in Southern States, it is slowly catching up. There is a need for popularising wheat and wheat products throughout the country for extending the supplies of other staple foods.

2. Process in brief

At the outset, it is desirable to emphasize on the basic requirements for obtaining a good quality bread. The quality of bread mainly depends on the quality of raw materials used and the processing conditions employed. Some of the processing conditions like mixing, fermentation, proofing, baking, etc., are very critical and it will vary from recipe to recipe as well as the flour used for bread making. For bread making, maida free from bran and milled from hard wheat containing at least 11% protein or about 9% gluten and having a creamy white colour is desirable.

3. Financial Estimates and Economic Feasibility

I. Total Project Cost	<u>Rs.'000</u>
1. Land and building	564.00
2. Plant and equipment	630.00
3. Contingencies, 15%	179.00
4. Technical knowhow fee	10.00
5. Preparation of DPR	40.00

6. Furniture & Fixtures	35.00
7. Preliminary & Pre-operative expenses	93.00
8. Working capital (Margin)	82.00

1633.00

II. Means of Finance (Technical)

Term loan	-	1012.00
Subsidy	-	254.00
Equity (17.5% of P.C.)	-	367.00

1633.00

DER = 1.63:1

III. Annual Cost of Production

1. Raw material	1080.00
2. Packaging material	270.00
3. Utilities and Overheads	210.00
4. Salary and wages	306.00
5. Depreciation (Bldg. 5% + P&E 15%)	93.00
6. Interest on term loan (13.5%)	137.00
7. Interest on short term loan (18%)	33.00
8. Merchandising expenses inclusive of sales commission	135.00

2264.00

IV. Annual sales

Sales of 3600 standard loaves per day @ Rs.2.40, the annual sales	2592.00
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V. Profitability

1. Annual sales	2592.00
2. Less cost of production	2264.00
3. Gross profit	328.00
4. Less taxes	108.00
5. Net profit	220.00

MANUFACTURE TAMARIND POWDER (500 kg/day)

1. Introduction

In the Indian cooking, tamarind is an important condiment/ adjunct used daily as a souring agent. The sourness is due to tartaric, malic and citric acid present in the fruit. India produces about 2.5-3.0 lakh tonnes of tamarind per annum, bulk of it coming from Madhya Pradesh, Andhra Pradesh, Tamil Nadu and Orissa. Tamarind is used in a variety of foods like sambar, rasam, puliogare, chutney, saucers, etc.

For greater convenience and better compactness in use and handling, "tamarind powder" with a free flowing nature is advantageous.

2. Process in brief :

Tamarind pulp as obtained from the trade is manually cleaned, deseeded and fibre is removed. The pulp is processed under standardised conditions of temperature, humidity and mill-settings in order to obtain an acceptable and hygienic product in powder form possessing good reconstititional characteristics. The product can be packed in HDPE pouches of desired unit packings.

3. Finanial Estimates and Economic Feasibility

I. Total Project Cost	<u>Rs. '000</u>
1. Land and building	330.00
2. Plant and equipment	305.00
3. Contingencies, 15%	95.00
4. Technical knowhow fee	30.00
5. Preparation of DPR	35.00

6. Furniture & Fixtures	25.00
7. Preliminary & Pre-operative expenses	50.00
8. Working capital (Margin)	117.00
	<u>987.00</u>

II. Means of Finance (Technical)

Term loan	-	598.00
Subsidy	-	167.00
Equity (17.5% of P.C.)	-	222.00

DER - 1.53

III. Annual Cost of Production

1. Raw material	660.00
2. Packaging material	940.00
3. Utilities and Overheads	210.00
4. Salary and wages	282.00
5. Depreciation (Bldg.5% + P&E 15%)	47.00
6. Interest on term loan (13.5%)	81.00
7. Interest on soft loan (18%)	62.00
8. Merchandising expenses	228.00

Total	2510.00

IV. Annual sales

150 tonnes of tamarind powder @ Rs.18,000/T	2700.00
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V. Profitability

1. Annual sales	2700.00
2. Less cost of production	2510.00
3. Gross profit	190.00
4. Less tax deduction	63.00
5. Net profit	127.00

MANUFACTURE OF POTATO FLOUR/POTATO CHIPS
(400 kg/day)

1. Introduction

Fruit and vegetable processing industry being highly labour intensive not only contribute towards solving rural unemployment, but can also be a potent instrument for the development of backward areas. Processing industries can mop up fruit and vegetable surpluses during the glut seasons and reduces the wastage, checking fall in prices and thus ensuring remunerative prices to the growers.

Potato processed into flour, can find use in a variety of dishes where potatoes are normally used and also find new uses as convenience foods; additive to other food products. Dehydrated chips and deep fat fried chips can find a niche in the array of convenience products in the market. The products have considerable scope and potential in the emerging food scene.

2. Process in Brief

a. Fried Potato chips: Potatoes are washed, inspected, peeled. The wet chips are dewatered before frying. The fried chips are salted and spiced before packing.

b. Dehydrated Potato chips: Potatoes are washed thoroughly and peeled in an abrasion peeler and after removal of eyes by trimming they are sliced and blanched in hot water containing salt and potassium metabisulphite. The wet chips are dewatered and then dried in a hot air drier - partially and they they are pressed and held in between wire meshes and further dried.

c. Potato flour: Potatoes are washed, inspected and peeled in an abrasion peeler. The peeled potatoes are diced and soaked overnight in a solution of salt and sodium metabisulphite. The soaked pieces are granulated in a mincer, pressed and dried. The dry granules are ground in a plate mill to obtain flour.

3. Financial Estimates and Economic Feasibility

Capacity : Fried chips	- 200 kg/day	150 days
Dehydrated flat chips	- 100 kg/day	75 days
Potato flour	- 100 kg/day	75 days

I. Total Project Cost	Rs. '000
1. Land and building	340.00
2. Plant and equipment	424.00
3. Contingencies, 15%	114.00
4. Technical knowhow fee	10.00
5. Preparation of DPR	45.00
6. Furniture & Fixtures	35.00
7. Preliminary & Pre-operative expenses	77.00
8. Working capital (Margin)	53.00

	1098.00

II. Means of Finance (Technical)

Term loan	-	680.00
Subsidy	-	186.00
Equity (17.5% of P.C.)	-	253.00

		1118.00

DER = 1.50

III. Annual Cost of Production

1. Raw material	486.00
2. Packaging material	62.00
3. Utilities and Overheads	267.00
4. Salary and wages	215.00
5. Depreciation (Bldg.5% + P&E 15%)	62.00
6. Interest on term loan (13.5%)	92.00
7. Interest on short term loan (18%)	20.00
8. Merchandising expenses	120.00

	1324.00

IV. Annual sales

1. Deep fat fried chips 30 T @ Rs.40/kg	1200.00
2. Flat dehydrated chips 7.5 T @ Rs.25/kg	187.00
3. Potato flour 8.1 T @ Rs.15/kg	122.00
4. Sale of recovered used oil 0.6 T @ Rs.10/kg	6.00

	1515.00

V. Profitability

1. Annual sales	1515.00
2. Less cost of production	1324.00
3. Gross profit	191.00
4. Less taxes	63.00
5. Net profit	128.00

MANUFACTURE OF CONVENTIONAL AND INSTANT PICKLE (200 kg/day and 150 kg/day)

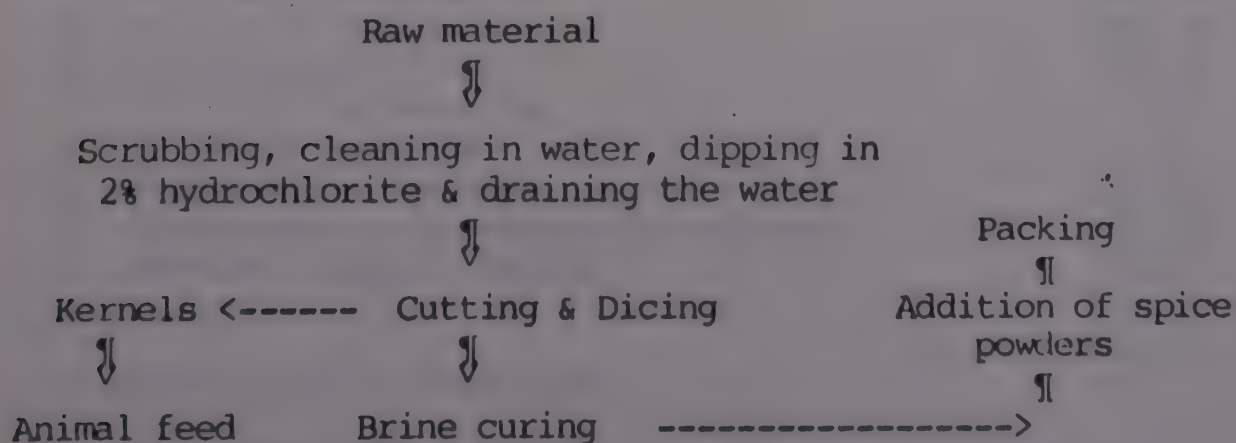
1. Introduction

Pickling is one of the methods of preservation of fruits like lime, lemon, green mango, etc., and vegetables like green chilli, cucumber, cabbage, carrot, etc., depending upon the availability of raw materials and consumer preference. Preservation of fruit and vegetable in the form of pickles is an old art and a wide variety of these are consumed in our country. Pickling has largely remained a household art in India and commercial exploitation of this art on a scientific basis has now been made possible with the advent of modern technology.

2. Process in brief

a. Pickle -

Pickle preparation is a well known method and involves the steps of careful selection of raw material, salting/curing, finishing and processing.



b. Instant pickle -

Fully matured fresh raw mangoes/lime are washed and cut into uniform sizes and cured. Cured mango/lime pieces are dried to the desired level. Cleaned and dried spices like red chillies,

turmeric and mustard are ground separately and are mixed with the cured and dried mango/lime pieces and packed in polythene bag.

Reconstitution of dry mix - The ready mix is soaked overnight in water to get the pickle ready for use.

3. Financial Estimates and Economic Feasibility

Rs. '000

A. Total Fixed Assets

a. Land	25.00
b. Building	264.00
c. Plant and equipment	247.00
d. Other block assets	125.00

	661.00

B. Annual Sales

1. Mango pickle - 30 T x Rs.25,000/-	750
2. Lime pickle - 30 T x Rs.24,000/-	720
3. Instant mango pickle - 22.5 T x Rs.32,000/-	720
4. Instant lime pickle - 22.5 T x Rs.32,000	720

	2910

C. Total Project Cost

Rs. '000

1. Land and building	289.00
2. Plant and equipment	247.00
3. Contingencies, 15%	80.00
4. Technical knowhow fee	10.00
5. Preparation of DPR	30.00
6. Furniture & Fixtures	20.00
7. Preliminary & Pre-operative expenses	65.00
8. Working capital (Margin)	152.00

	893.00

D. Annual Cost of Production

1. Raw material	1332.00
2. Packaging material	600.00
3. Utilities and overheads	408.00
4. Salary and wages	176.00
5. Depreciation (Bldg. 5% + P&E 15%)	39.00
6. Interest on trm loan (13.5%)	62.00
7. Interest on soft loan (18%)	72.00
8. Merchandising expenses	66.00

Total

2755.00

E. Profitability	Rs.'000
1. Annual sales	2910.00
2. Less cost of production	2755.00
3. Gross profit	155.00
4. Less tax deduction	51.00
5. Net profit	104.00

06

MANUFACTURE OF FRUIT BEVERAGES AND KETCHUP/SAUCE
(7000 units per day)

1. Introduction

In India, both the tropical and temperate fruits are grown on commercial scale. Mango, pineapple, orange, lime in processed form have great demand in internal as well as export market. Mostly, these fruits are used for its juice/pulp in one form or the other. The popularity of beverages based on fruits is increasing.

Tomatoes are grown throughout India. The surplus production during the glut season could be suitably processed in the form of ketchup/sauce as these are quite popular products.

2. Market Information

Emphasis has been repeatedly laid on manufacture of products based on fruits so that the surplus fruits in growing areas are not wasted. The consumption of fruit juices is gaining importance due to its nutrition and health values. The comparable costs of fruit juices vis-a-vis sweetened aerated water has encouraged the consumption of fruit juices. If this trend can be promoted and the prices kept competitive, it may bring a sea change in the consumption of fruit based drinks.

3. Process in Brief

a. Squashes/Cordials

Squashes are prepared from unclarified fruit pulps/juices and cordials from clarified fruit juices.

Sound fully ripe fruits are washed thoroughly, peeled and

stones and cores are removed wherever necessary, and passed through pulper (mango), minced and pressed in hydraulic presses (Pineapple), or passed through screw type juice extractors (Oranges) or the juice is extracted by rosin machines (Limes, lemons). The juice obtained is strained through stainless steel sieves to remove seeds and other bigger particles.

Sugar syrup is prepared separately and mixed with fruit juice and acidity adjusted. To the final product desired flavours and permitted colour are also added and preserved by potassium metabisulphite or sodium benzoate to the maximum limits of 350 ppm Sulphur dioxide or 600 ppm benzoic acid in the final product.

The squash/cordial is filled in sterilized bottles and sealed airtight.

b. RTS Beverages

The juice/pulp extracted and clarified from the selected fruits as above. It is mixed with sugar, citric acid and water to get the desired strength of the fruit beverage. Preservatives and other ingredients are added to the RTS beverage and hot filled to the pouches and sealed.

c. Tomato Ketchup or Tomato Sauce

The juice obtained as described earlier is concentrated in open stainless steel pans with sugar, table salt. Condiments and spices like onion, garlic, ginger, chilli powder, cloves, cardamom, black pepper, jeera, mace, cinnamon, etc. are added as extractives or are extracted in the pulp during concentrating by putting these into the pulp, in cloth bag and the cloth bag finally taken out and the adhering juice is squeezed into the

pulp. A part of the required sugar is added initially, and the rest is added at the finishing. Salt is also added towards the end of concentration. Generally concentration is done 3 fold. To the finished product, vinegar or acetic acid is added to get 0.6 to 0.7% acidity in the final product, this amounts to about 300 ml glacial acetic acid per 100 kg original juice or 5 L vinegar per 100 kg juice. The final product could be preserved by the addition of sodium benzoate @ 750 ppm benzoic acid. The tomato sauce is filled hot into clean bottles, crown corked and processed in boiling water for 30 minutes.

4. Financial Estimates and Economic Feasibility

Rs.'000

A. Total Fixed Assets

a. Land	25.00
b. Building	469.00
c. Plant and equipment	340.00
d. Other block assets	125.00

	959.00

B. Annual Sales 6825.00

C. Annual Cost of Production

1. Raw material	2772.00
2. Packaging material	3336.00
3. Utilities and Overheads	216.00
4. Salary and wages	268.00
5. Depreciation (Bldg.5% + P&E 15%)	58.00
6. Interest on term loan (13.5%)	97.00
7. Interest on short term loan (18%)	265.00
8. Merchandising expenses	26.00

Total	6538.00

D. Profitability

Rs.'000

1. Annual sales	6825.00
2. Less cost of production	6538.00
3. Gross profit	287.00
4. Less tax deduction	95.00
5. Net profit	192.00

63

MANUFACTURE OF ENERGY FOOD (3 TONNES PER DAY)

1. Introduction

Protein-calorie malnutrition is one of the most important nutritional deficiencies among children in developing countries. It impairs the physical and mental growth of children who suffer from the deficiency in infancy but somehow manage to survive. On account of inadequacy in the intake of proper basal diet supplements like pulses, milk and vegetable, vitamin deficiency disorders are also commonly observed in this group. To combat these deficiency disorders at the early stages, Central and State Governments have launched several nutrition intervention programmes. In these programmes, the supplementary food is designed to make up the deficiency in protein and calorie, and provide the needed vitamins and minerals.

Keeping in view of the above factors Energy Food has been developed. This is an almost ready-to-eat food and does not need extensive cooking at the point of distribution. This food was extensively tried out in the Nutrition Programme of the India Population Project.

2. Raw Materials and Packaging Material

Wheat	Polybags and polywooven sacks
Bengalgram dhal	
Soya flour	
Jaggery	
Vitamins and minerals	

3. Process in Brief

The process consists mainly of pre-cleaning all the raw materials, roasting under optimal conditions, powdering them to the required mesh size and ultimate mixing.

The cleaned wheat is continuously fed into a roaster and roasted into golden brown colour, and it also develops a pleasant aroma at this stage. After it is cooled by a blower attached elevator, and once again cleaned and destoned. The destoned cleaned material is ground to the desired mesh size in hammer mills.

The cleaned bengalgram dhal is roasted till it develops a fine aroma. This is then cooled, cleaned, destoned. The destoned dhal is ground in flour mills to the desired mesh size.

Soya flour first roasted in electrical roaster. It is then cooled and ground to desired mesh size.

Jaggery is broken into small bits. It is then mixed with calcium carbonate and some wheat flour and passed through a multi mill to get a course flour.

The mix has a pleasant flavour and good acceptability. It can be consumed as such and requires no elaborate cooking as in the case of other available high protein supplements. If desired, it could be mixed with water or milk to make a porridge or paste, which is ready for consumption.

4. Financial Estimates and Economic Feasibility
Capacity : 3 Tonnes/8 hr/Shift/Day

I. Total Project Cost Rs.'000

1. Land and building	660
2. Plant and equipment	2307
3. Contingencies @ 15%	445
4. Furniture & fixtures	40
5. Preliminary & pre-operative	304
6. Preparation of D.P.R. $\frac{1}{4}$	60
7. Technical knowhow	
8. Margin money for working capital	230

	4046

II. Means of Finance

Term loan	-	2366
Soft loan	-	400
Subsidy	-	572
Equity	-	708

		4046

$$DER = 2.18$$

III. Annual Cost of Production Rs.'000

1. Raw material	3291
2. Packaging material	288
3. Utility and overheads	433
4. Salary and wages	260
5. Depreciation (Building 5% + Plant 15%)	279
6. Interest on term loan @ 13.5%	319
7. Interest on S.T. loan @ 18%	145
8. Handling and service charges @ 10%	502

	5517

$$\text{Cost of Production per Kg} = \underline{\text{Rs.6.13}}$$

IV. Annual Sales -

Selling of 900 T per annum @ Rs.7000/Tonne 6300

V. Profitability

1. Annual sales	6300
2. Less cost of production	5517
3. Gross profit	783
4. Less Tax	258
5. Net profit	525

MANUFACTURE OF INSTANT MIXES (500 kg/day)

1. Introduction

Ready mixes save time and labour, and provide hygienic products of standard and uniform quality with good shelf life. These mixes could find a ready market in the urban, middle income working families, industrial labour and large scale catering establishments because of the convenience and saving in time in preparing such foods.

2. Process in brief

The process for manufacture of idli, dosa, vada, jamun and jilebi consists of operations like cleaning of raw material, grinding, size separation, mixing and packing, all being dry processing steps. The raw materials like rice, blackgram dhal, etc., are cleaned, ground and sifted to the required particle sizes. The process for jamun involves mixing of readily available ingredients and packing. Hence, required and graded materials are mixed in certain proportions so as to obtain good quality finished products with profiles not different from the accepted/conventional products.

Ready mixes should be fumigated to protect from infestation hazards and to preserve them during further storage and distribution.

3. Financial Estimates and Economic Feasibility
500 Kg/Day/Shift

0.9

I. Total Project Cost

Rs. '000

1. Land and building	604
2. Plant and equipment	306
3. Contingencies @ 15%	136
4. Furniture & fixtures	35
5. Preliminary & pre-operative	72
6. Preparation of D.P.R.	40
7. Technical knowhow	50
8. Margin money for working capital	136

	1379

II. Means of Finance (Rs. '000)

Term loan	-	1000
Subsidy	-	235
Equity	-	310

DER = 1.53:1

III. Annual Cost of Production

1. Raw material	2376.00
2. Packaging material	300.00
3. Utility and overheads	137.00
4. Salary and wages	243.00
5. Depreciation (Building 5% + P&E 15%)	59.00
6. Interest on term loan @ 13.5%	113.00
7. Interest on S.T. loan @ 18%	85.00
8. Merchandising expenses @ 10 %	331.00

	3644.00

IV. Annual Sales

150 T of Instant mix @ Rs.26,000/-	3900.00
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V. Profitability

1. Annual sales	3900.00
2. Less cost of production	3644.00
3. Gross profit	256.00
4. Less Tax	85.00
5. Net profit	171.00

MANUFACTURE OF MALTED WEANING FOOD (500 KG/DAY)

1. Introduction

Throughout the world, parents take particular care of food needs of infants and children. During the early period of growth, food and nutritional requirements continuously increase and unless care is taken to provide adequate food and nutritional requirements at this stage, irreparable damage may occur to physical growth and development of mental faculty of the child. Though this has been realised in India in recent years and measures have been worked out and implemented, in some cases, to provide adequate food and nutritional requirements to children, the concept has not yet developed to the extent necessary and desired.

Malted weaning food is entirely a new product in weaning food formulation. The product is a malted cereal and pulse mix with an entirely new and natural flavour profile compared to the bland flavour of milk cereal weaning foods widely marketed. The low hot paste viscosity of the product increases the intake per feed for the baby and hence be more appealing to the mother. The product will compete with the presently marketed milk cereal weaning foods and will win acceptance and patronage.

2. Process in Brief

The raw materials, ie. ragi and greengram are pre-cleaned, washed thoroughly in water and steeped for 16-18 hours in water. Ragi and greengram are germinated for a further period of 48 hours and 24 hours, respectively. Germinated grains are dried to 12% moisture content and kilned to a level of 6% moisture content.

Ragi is devegetated, conditioned, pulverised and sieved. Green-gram, after splitting and removal of husk, is powdered. Ragi flour is blended with greengram flour in recommended proportions and fortified with milk powder, minerals and vitamins.

3. Financial Estimates and Economic Feasibility 500 Kg/Day/Shift

I. Total Project Cost	<u>Rs. '000</u>
1. Land and building	578
2. Plant and equipment	565
3. Contingencies @ 15%	171
4. Furniture & fixtures	30
5. Preliminary & pre-operative	88
6. Preparation of D.P.R.	40
7. Technical knowhow	10
8. Margin money for working capital	125

	1607

II. Means of Finance (Rs. '000)

Term loan	-	1000
Soft loan	-	-
Subsidy	-	245
Equity	-	362

		1607

$$\text{DER} = 1.65$$

III. Annual Cost of Production	<u>Rs. '000</u>
1. Raw material	1080.00
2. Packaging material	412.00
3. Utility and overheads	285.00
4. Salary and wages	242.00
5. Depreciation (Building 5% + P&E 15%)	86.00
6. Interest on term loan @ 13.5%	135.00
7. Interest on S.T. loan @ 18%	73.00
8. Merchandising expenses @ 10 %	231.00

	2544.00

IV. Annual Sales

Sale of 150 T of weaning food @ Rs.19000/T	2850.00
Sale of dried sprouts for cattle feed @ Rs.1000/T	3.00

	2853.00

V. Profitability

1. Annual sales	2853.00
2. Less cost of production	2544.00
3. Gross profit	309.00
4. Less Tax	102.00
5. Net profit	207.00

MANUFACTURE OF SPICE/MASALA POWDER
(500 kg/day)

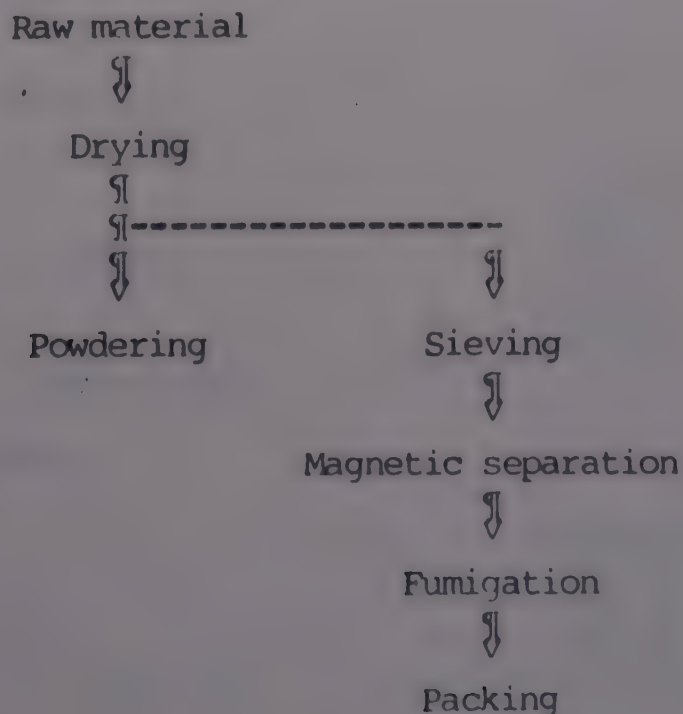
1. Introduction

Spices are important constituents in flavouring food. While India has been the world's largest producer of spices, we also consume a very large proportion of our production. Most of the spices are ground before they are consumed. Ground spices are extensively used in all types of curried dishes in India and abroad. They are used for seasoning of egg fish, meat, sauces, chutney, pickles, frankfurters, sausages. Ground spices like turmeric powder and chilli powder are used as food colourant apart from their use as flavourings and medicinal applications in pharmaceutical preparations.

2. Process in brief

The main steps involved in the spice and masala powder preparations are pre-cleaning, drying, grinding, sieving, mixing and packing. The formula varies with the consumer requirements. Taste preferences should be ascertained before marketing.

Spice powder -



1. Raw material	3336.00
2. Packaging material	396.00
3. Utilities and Overheads	243.00
4. Salary and wages	269.00
5. Depreciation (Bldg.5% + P&E 15%)	67.00

6. Interest on term loan (13.5%)	113.00
7. Interest on short term loan (18%)	90.00
8. Merchandising expenses	451.00

4965.00

IV. Annual sales

1. Turmeric powder 45 T x @ 18000	810.00
2. Chilli powder 45 T x @ 30000	1350.00
3. Coriander powder 15 T x @ 20000	300.00
4. Pepper powder 15 T x @ 65000	975.00
5. Masala powder 30 T x @ 60000	800.00
	<u>5235.00</u>

V. Profitability

1. Annual sales	5235.00
2. Less cost of production	4965.00
3. Gross profit	270.00
4. Less taxes	89.00
5. Net profit	181.00

PAPAD PRESS
(500 Kg/day)

1. Introduction

Papads form a popular food adjunct in Indian dietary. It is essentially a thin wafer like product, circular in shape, rolled from a dough made out of pulse flour and/or farinaceous materials with added salts and spices. Papad is also known as Appalam in South India. 'Papadam', popular in Kerala is different from papad from other parts of the country that it has a higher moisture content and puffs on frying. Though traditionally confined to the household, papad making in recent years has developed into cottage scale and small scale industries. This changing situation has posed multifaceted problems such as quality of ingredients used, method of preparation, processing, packaging and storage characteristics.

Commercial papads have wide variations in ingredient weight, diameter, thickness, moisture, ash, acid insoluble ash, alkalinity and pH, and organoleptic characteristics. The undesirable qualities are alkaline taste, number of holes, presence of foreign matters on the surface and foamy oil deposit on fried material.

2. Raw Materials

Blackgram flour
Rice flour
Common salt
Spices
Sodium carbonate

HDPE pouches and cartons

3. Process in brief

Weighed quantity of flour is taken in a mixer. A solution of common salt and carbonate in requisite amount of water is added and then constituents are kneaded at maximum speed to get a homogenous lump of dough. After resting the dough for about 30 min. it is divided into balls of about 2 cm dia each weighing about 5-6 g. These are rolled into thin circular disc of about 1 mm in thickness by using wooden rolling pin. Starch can be used as a dusting material to prevent stickiness during rolling. The papads are rolled or cut into a uniform circular discs which are usually dried to 14-15% moisture content by spreading in a room at a temperature of 25-31°C and RH of 64-70%. Also it can be dried in a cabinet drier at 64-66% RH and 31°C for 6 hrs, which gives a papad of acceptable quality.

4. Financial Estimates and Economic Feasibility

Manufacturing of papad : 500 kg/day/shift
Working : 300 days

I. Total Project Cost		Rs.'000
1. Land and building		433.00
2. Plant and equipment		391.00
3. Contingencies, 15%		124.00
4. Technical knowhow fee		10.00
5. Preparation of DPR		20.00
6. Furniture & Fixtures		20.00
7. Preliminary & Pre-operative expenses		64.00
8. Working capital (Margin)		106.00

		1168.00
II. Means of Finance (Technical)		
Term loan	-	735.00
Subsidy	-	170.00
Equity (17.5% of P.C.)	-	263.00

		1168.00

DER = 1.75:1

III. Annual Cost of Production

1. Raw material	936.00
2. Packaging material	180.00
3. Utilities and Overheads	140.00
4. Salary and wages	442.00
5. Depreciation (Bldg. 5% + P&E 15%)	61.00
6. Interest on term loan (13.5%)	99.00
7. Interest on short term loan (18%)	48.00
8. Merchandising expenses	95.00

	2001.00

IV. Annual sales

Sale of papad of 150 T produced/annum @ Rs.15,000/T	2250.00
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V. Profitability

1. Annual sales	2250.00
2. Less cost of production	2001.00
3. Gross profit	249.00
4. Less taxes	82.00
5. Net profit	167.00

LEAF CUPS AND PLATES (10,000 per day)

1. Introduction

Abundantly available agricultural and forest products such as leaves of Banana, Beautia, Bauhinia and Sheath of Arecanut Palm are used for making small containers of different shapes in many parts of the country, for serving foodstuffs. It is estimated that as many as 50 million of such containers or as they are termed Donnas are made from dry Banana leaves in Karnataka and equal number from Beautia leaves in Orissa. The existing products made by rural craftsmen are very poor in physical strength and are far from being clean and hygienic.

2. Raw materials and packaging

- Banana leaves
- Bauhinia leaves
- Beautia leaves
- Sheath of Palm trees
- Other suitable forest leaves

3. Process in brief

The leaves are initially dried in the sun or in shade. Care should be taken to see that the leaves are sufficiently dried to avoid fungus attack. They should not be overdried as they become brittle. The dried leaves are arranged and bundled either in gunny bags or bamboo baskets and stored for further use.

At the time of making cups the required quantity of leaves are taken out and dipped in water for about 5 min. and wiped with a clean cloth to remove dust and dirt. The leaves are again dried while retaining their pliability. The leaves in this condition

are kept in a polythene bag to avoid drying before their use.

The machine can produce shallow plates/cups/donnas from various leaves. The leaf of sufficient size is placed on the lower die platten, the pedal is pressed down and released after a few seconds. During this single operation machine presses, folds and trims the leaf into the required shape.

When leaves with low tearing strength like banana leaves are used they are reinforced with another layer of leaf or paper to increase their rigidity and tearing resistance. No adhesive is needed to keep the two layers together.

4. Financial Estimates and Economic Feasibility Capacity : 10,000 per day

I. Total Project Cost			Rs. '000
1.	Land and building		140.00
2.	Plant and equipment		124.00
3.	Contingencies, 15%		40.00
4.	Technical knowhow fee		10.00
5.	Preparation of DPR		20.00
6.	Furniture & Fixtures		15.00
7.	Preliminary & Pre-operative expenses		20.00
8.	Working capital (Margin)		27.00

			396.00
II. Means of Finance			
	Term loan	-	231.00
	Subsidy	-	75.00
	Equity	-	90.00

			396.00
III. Annual Cost of Production			
1.	Raw material		150.00
2.	Utilities and Overheads		45.00
3.	Salary and wages		134.00
4.	Depreciation (Bldg. 5% + P&E 15%)		19.00
5.	Interest on term loan (13.5%)		31.00
7.	Interest on soft loan (18%)		10.00
8.	Merchandising expenses @ 10%		40.00

			429.00

IV. Annual Sales

30 lakh leaf cups @ Rs.175/- per 1000 cups	526.00
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V. Profitability

1. Annual sales	526.00
2. Less cost of production	429.00
3. Gross profit	97.00
4. Less tax deduction	32.00
5. Net profit	65.00

MANUFACTURE OF JAM, JELLY AND MARMALADE (250 kg/day)

1. Introduction

Fruit and vegetable processing industry has a vast potential in India. The processing industry is utilising less than 3% of the fruits produced though very large quantities are available for processing especially during glut season. Jam, jelly and marmalades are processed fruit products with sugar as preservative.

2. Process in brief :

JAM -

It is a product prepared by boiling the fruit pulp (sometimes whole fruits) with sufficient quantity of sugar to a moderately thick consistency, firm enough to hold the fruit tissues in position. It is commercially produced by using ca 45 parts of fruit pulp for every 55 parts of sugar. It should contain 68% soluble solids as determined by refractometer, when cold, and uncorrected for insoluble solids. Usually both ripe and semi-ripe fruits are used for obtaining good quality jam.

JELLY -

It is a product prepared by boiling clear fruit extract (with or without water) with sugar and boiling the mixture to a stage at which it will set to a clear jel. A perfect jelly should be transparent, well set but not too stiff and should have the original flavour of the fruit. It should not be syrupy, sticky or gummy. It should be tender enough to quiver but should not flow.

When cut, it should retain its shape and show a clear-cut surface.

Pectin, sugar and acid in proper proportions are important for the preparation of good quality jelly.

MARMALADE -

Marmalade is a fruit jelly in which the slices of the fruit or the peel are suspended. The term generally is associated with the products made from citrus fruits like oranges and lemons in which shredded peel is included as suspended material.

Santaras (loose-skinned oranges), maltas (tight-skinned oranges) and khattas (rough lemons) are suitable. Even fruits of inferior quality having very little of juice, but otherwise sound, can be used. Use two oranges either maltas or santaras, for each khatta.

Pattern of production

Mango jam	90 days	250 kg/day
Pineapple jam	90 days	250 kg/day
Mixed fruit jam	60 days	250 kg/day
Guava jelly	30 days	250 kg/day
Orange marmalade	30 days	250 kg/day

3. Financial Estimates and Economic Feasibility

I. Total Project Cost	Rs. '000
1. Land and building	376.00
2. Plant and equipment	369.00
3. Contingencies, 15%	112.00
4. Technical knowhow fee	10.00
5. Preparation of DPR	35.00
6. Furniture & Fixtures	20.00
7. Preliminary & Pre-operative expenses	75.00
8. Working capital (Margin)	94.00

	1091.00

II. Means of Finance (Technical)

Rs.'000

Term loan	-	640.00
Soft loan	-	86.00
Subsidy	-	175.00
Equity (17.5% of P.C.)	-	190.00

III. Annual Cost of Production

1. Raw material	612.00
2. Packaging material	456.00
3. Utilities and Overheads	144.00
4. Salary and wages	187.00
5. Depreciation (Bldg. 5% + P&E 15%) (3rd year of operation)	56.00
6. Interest on term loan (13.5%)	86.00
7. Interest on soft loan (18%)	46.00
8. Merchandising expenses (LS)	81.00

1668.00

IV. Profitability

1. Annual sales	1860.00
2. Less cost of production	1668.00
3. Gross profit	192.00
4. Less tax deduction	63.00
5. Net profit	129.00

